

**Tectibranch Molluscs from Southern Africa.**

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With 3 Text-figures.

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**PART 1. CEPHALASPIDEAN MOLLUSCS FROM THE  
SHORES OF SOUTHERN AFRICA.**

**I. INTRODUCTION.**

BECAUSE many of this group of molluscs possess shells they have had relatively more attention from conchologists than most other opisthobranchiate molluscs yet they are not so well known as they deserve to be. Many of the records already published from the area apply to shells only and since these are light and buoyant they may be carried far from the haunt of the living animal. Hence a record based on the finding of the shell alone may not be a valid one. This applies to many of the records resulting from the collections of Col. W. H. Turton who collected shells on the beaches of Port Alfred and district.

In this paper will be found records and short descriptions of sixteen species most of which are widely distributed in the Indo-west-Pacific biogeographic region. Some, however, are strangely local in their distribution: in particular the species of *Haminea* of which four appear to replace one another successively round the coast with only a slight overlap between species.

The coast line from which specimens have been studied extends from the vicinity of Cape Town to Inhaca island in southern Mozambique.

Collections examined originated from the Ecological Survey of University of Cape Town (U.C.T. in the records which follow) the Zoological Department of the University of the Witwatersrand, Johannesburg (U.W.) and from the author's own collection (W. M.).

*Acknowledgments.*

I wish to thank Dr. H. J. Swart for the drawings in text-figs. 1 and 2 ; also Dr. J. Pringle, Director of the Natal Museum, for the loan of the specimen of *H. subcylindrica* from the Burnup Collection.

## II. DESCRIPTIONS OF SPECIES.

*Solidula solidula* (L.).

For synonymy and description see Pilsbry, 1893, p. 142, pl. 20A, figs. 37, 38, 44, 45 ; Bergh, 1902, p. 319, pl. 27, figs. 30-31.

A few shells have been picked up at Inhaca. It has been recorded from Natal by Sowerby (1892). Living specimens have not been found.

*Hydatina physis* (L.).

For synonymy and description see Pilsbry, 1893, p. 387, pl. 45, figs. 14-17, and as *Aplustrum physis* (L.) Bergh, 1901, p. 247, pl. 20, figs. 35-44 ; Vayssière, 1906, p. 32, figs. 45-51.

This species which is almost tropicopolitan has been recorded from the following places in Southern Africa : Inhambane (Martens, 1879), Inhaca (Macnae and Kalk, 1958), Natal (Krauss, 1848), Durban Bay (U.C.T.), Port St. Johns (W. M.), Port Alfred (shells by Bartsch, 1915 and Turton, 1932, and alive by W. M.), and Port Elizabeth (Sowerby, 1897).

The shells are easily recognized by the numerous spiral lines of brown or brownish purple on a white ground. The animal is pinkish violet with bright blue margins.

*Hydatina velum* (Gm.).

For synonymy and description see Pilsbry, 1893, p. 388, pl. 44, figs. 7-10, and as *Aplustrum velum* (Gm.) Bergh, 1901, p. 242, pl. 20, figs. 45-50, pl. 21, figs. 1-10 ; Vayssière, 1906, p. 29, figs. 52-55 ; *Hydatina* (*Aplustrum*) *velum* Gm. Eales, 1938, pl. 79, text-fig. 1, pl. 1, fig. 8.

This Indo-west-Pacific species has been recorded from Inhambane (Martens, 1879), Inhaca (W. M.) and from Durban Bay (U.C.T.).

The colour pattern on the shell of this species is very distinctive. The general colour is whitish, longitudinally streaked with brown, in the middle a narrow light girdle bordered by two girdles of dark brown : similar dark girdles encircle the apex and base, the area within the apical girdle being light.

*Hydatina albocincta* (Hoeven).

For synonymy and description see Pilsbry, 1893, p. 388, pl. 45, figs. 29, 30, and as *Aplustrum albo-cinctum* (Hoeven) Bergh, 1901, p. 251, pl. 22, figs. 18-23.

This Indo-west-Pacific species was collected in Durban Bay (U.C.T.).

As in other species of this genus, the shell is distinctive. It has a very thin periostracum and is streaked with brown apart from five white spiral bands.

*Amplustrum amplustre* (L.).

For synonymy and description see *Hydatina amplustre* (L.) Pilsbry, 1893, p. 390, pl. 44, figs. 1-6, and *Aplustrum amplustre* (L.) Bergh, 1901, p. 250, pl. 21, figs. 11-15.

This species is common at Inhaca. It is widespread in the Indo-west-Pacific.

When the animal is alive the shell has a very fine but strong golden brown periostracum which projects beyond the edge of the calcareous layers; it is white or pink with narrow black bands. The animal is translucent white, or bluish pink.

*Bulla ampulla* L.

For synonymy see Pilsbry, 1893, p. 343, pl. 34, figs. 1-3; Bergh, 1901, p. 210, pl. 18, figs. 9-25; Vayssière, 1906, p. 18, figs. 27-33; Eales, 1938, p. 81, text-fig. 2.

*B. ampulla* has been recorded from the Querimba Is. in northern Moçambique, from Moçambique Is. and from Inhambane (Martens, 1879), from Natal (Krauss, 1848), from Port Alfred (Bartsch, 1915, and Turton, 1931), from Port Elizabeth (Sowerby, 1897) and from the Cape of Good Hope (Bartsch, 1915). I have found shells at several localities between Knysna and Inhaca and on one occasion a living specimen at Inhaca. Whether the presence of washed up shells is a true reflection of the occurrence of the animal or not, is doubtful; many of these records are of shells only. The late Mr. A. Knowles Jordan of Port Alfred told me that he had occasionally found living specimens there. Because of their habit of burrowing into the mud, where they lie in a mucous "nest", they must frequently escape notice.

The shell is solid, in size almost as big as a hen's egg. In colour it is buff, closely spotted with brownish or pinkish purple, usually with darker cloudy areas of irregular shape and variable size. When fresh the shell is completely smooth and polished. The animals are uniform purplish in colour. They feed on molluscs which are swallowed whole and crushed by the gastric plates.

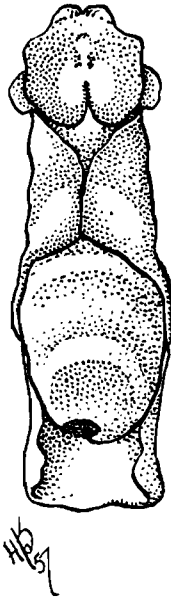
*Atys (Aliculastrum) cylindrica* (Helbling). Text-fig. 1.

For synonymy and description see Pilsbry, 1893, p. 265, pl. 33, figs. 60-64; Bergh, 1901, p. 258, pl. 20, figs. 1-12; Vayssière, 1906, p. 11, figs. 17-26.

This species which has been recorded from various localities throughout the Indo-west-Pacific has not previously been recorded from Southern Africa. It is abundant in the shallow pools and runnels on the upper mid-littoral at Inhaca.

A sketch of the living animal is shown in text-fig. 1. Fully expanded living specimens may reach a length of 25 mm. with a shell half that length.

The shell is elongated and subcylindrical, solid with a thin golden buff periostracum ; the apex is closed and the body whorl not widely open ; it is sculptured with " incised spiral lines which become closer towards the ends and absent from the smooth middle third " (Pilsbry). The shell is white with a yellow to golden flush towards each end, the ends themselves being white. The body of the animal is translucent white.



TEXT-FIG. 1.

*Atys cylindrica* sketched from life.

The mouth is armed with a thin cuticle, and jaws are present. The radula is comparatively narrow—there are 26–32 rows of 11.1.11 teeth. Each tooth has very fine denticles on the inner margin. The jaws are formed of imbricating rodlets, each rodlet being bluntly comb-like at the tip. The gizzard plates are also made up of rodlets arranged in ridges which run across the jaw plate. The tip of each rodlet is swollen into a tiny knob.

The animal presumably feeds on young bivalves and other organisms which are found in the upper few millimetres of the sand in which the animal lives. These are subsequently crushed by the gizzard plates. The intestinal contents are similar in appearance to the substratum on which the animals are living.

Egg masses are gelatinous and pear-shaped, the stalk of the pear being anchored to a piece of debris just beneath the surface of the soil. Individual eggs are tiny and arranged in a spiral within the mass.

*Haminea* Leach.

Five species of *Haminea* have been recorded by conchologists from Southern Africa. These are *H. natalensis* Krauss, *H. petersi* Martens, *H. gracilis* Sowerby, *H. subcylindrica* Sowerby and *H. alfredensis* Bartsch. With the exception of *H. subcylindrica*, illustrations of the shells have been published. Bergh (1901), has given a few details of the buccal and gizzard armature of *H. natalensis*, but no details are known for the other species.

Living specimens of four of the five species have been studied. I have also examined a shell from the Burnup Collection of the Natal Museum which has been identified with reasonable certainty as being *H. subcylindrica* and give an illustration of it (text-fig. 2e).

In external appearance the four species seen alive are very much alike and in localities where two or more were collected in similar situations they were not separated in the field, and this in spite of the fact that one was aware of the possibility of finding more than one species. All species have been found on diatom covered sandy mud, or crawling on and among diatom covered marine angiosperms. All appear to be euryhaline, tolerant of a wide range of salinity ranging from almost fresh water to hypersaline pools. They are also tolerant of a wide range of temperatures. Lower limits have not been noted, upper limits are high. *H. alfredensis* has been seen crawling actively in pools with a temperature of 35° C. at Zwartkops near Port Elizabeth and *H. petersi* and *H. natalensis* have been seen copulating and laying eggs in a pool with a temperature of 41° C., at Inhaca.

The four species studied appear to replace one another as one proceeds northwards. *H. alfredensis* extends from the vicinity of the Cape to East London; *H. natalensis* from Port Alfred, where it is most uncommon, to southern Moçambique it is the commonest form in Durban Bay; *H. gracilis* is the commonest form at St. Lucia in northern Natal; and *H. petersi* is the form common in southern Moçambique.

The general anatomy of those specimens which were killed in a state of sufficient relaxation for easy dissection show that *H. alfredensis* and *H. petersi* are very similar to the Mediterranean form, *H. navicula*, described by Guiart (1901).

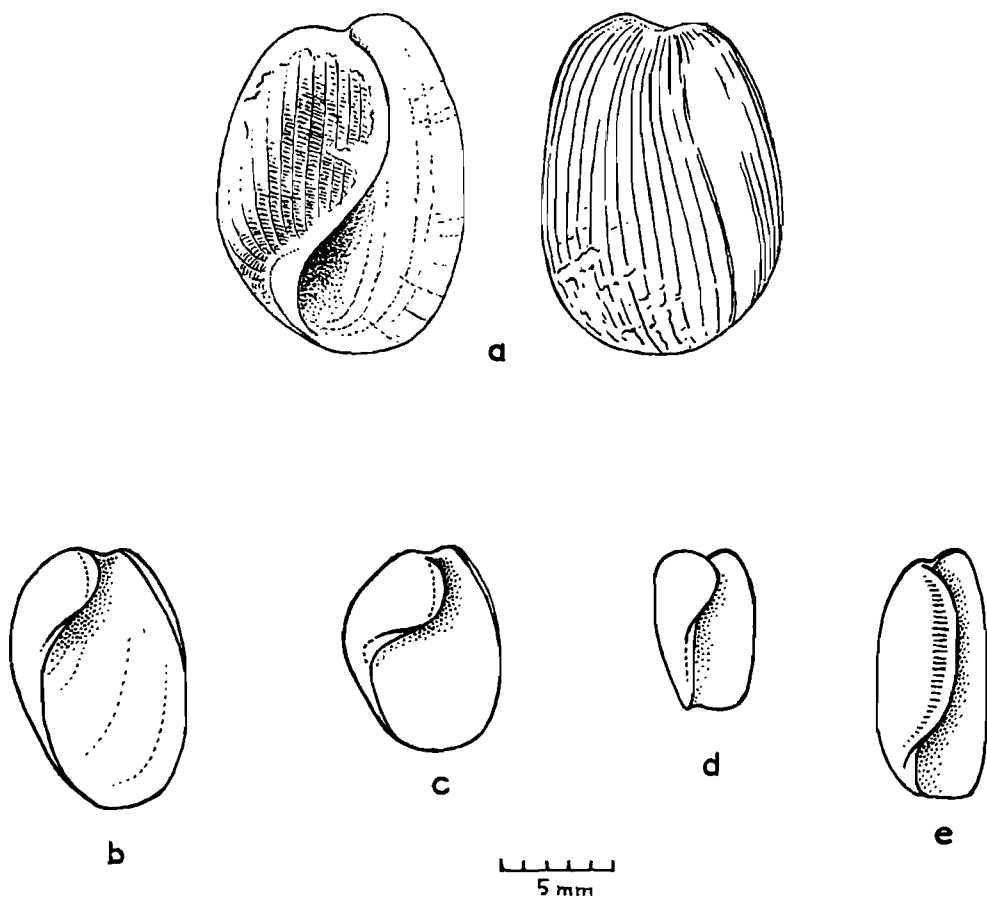
*Haminea natalensis* (Krauss). Text-figs. 2b, 3a.

*Bulla natalensis* Krauss, 1848, p. 71, pl. 4, fig. 14; Martens, 1880, p. 303.

*Haminea natalensis* (Krauss) Sowerby, 1892, p. 53; Pilsbry, 1893, p. 367, pl. 40, figs. 80, 81;

Kobelt, 1896, p. 110, pl. 16, figs. 4, 5; Bergh, 1901, p. 224, pl. 18, figs. 18-41; Turton, 1932. *non B. natalensis* A. Ad. in Sowerby's *Thesaurus*, pl. 124, fig. 86 nor *H. natalensis* Sowerby in *Conch. icon.*, fig. 7, both of which are *H. peruviana* D'Orb. (vide Pilsbry, 1893).

This was the only species collected in Durban Bay by the University of Cape Town Ecological Survey. Specimens have been collected from St. Lucia (W. M.) and Inhaca (W. M.). Shells have been reported from Mauritius

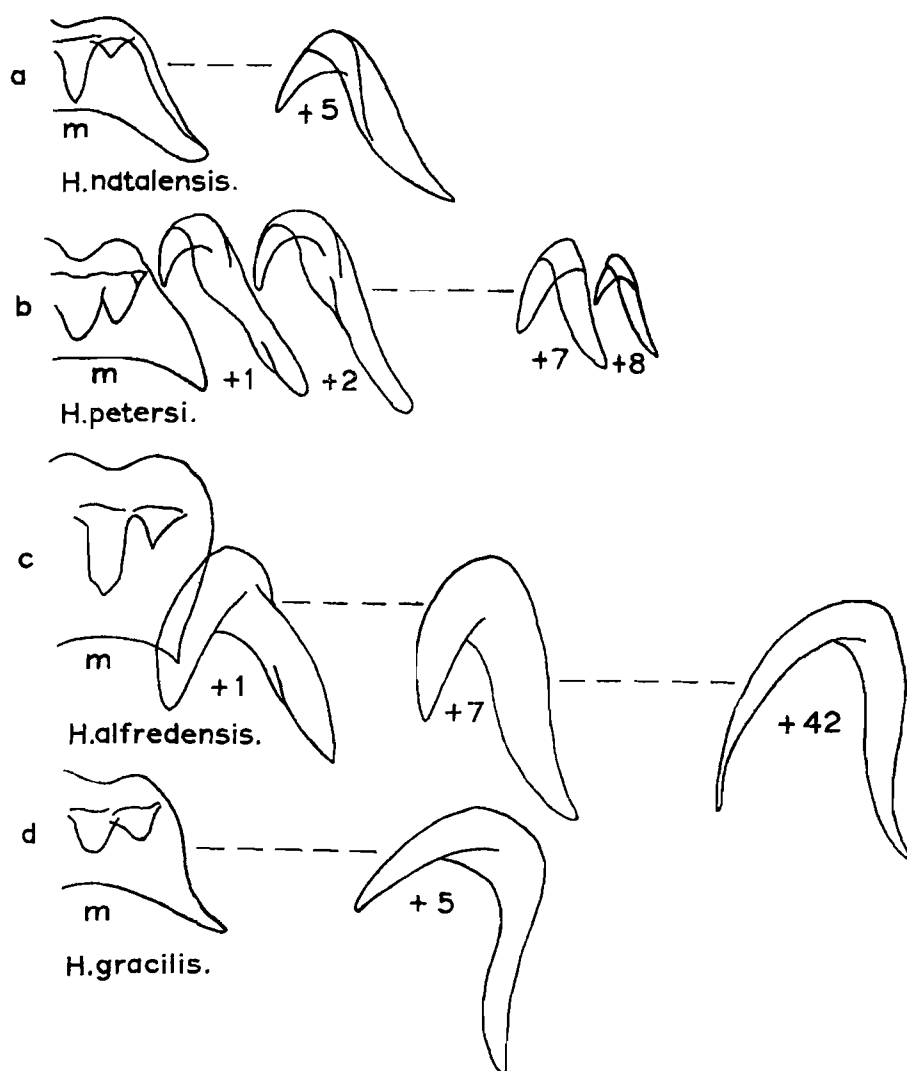


TEXT-FIG. 2.

Shells of species of *Haminea*. (a) *H. petersi* (ventral and dorsal views), (b) *H. natalensis*, (c) *H. alfredensis*, (d) *H. gracilis*, (e) *H. subcylindrica* (ventral views).

(Martens, 1880) and from Port Alfred (Turton, 1932). The specimens described by Bergh were collected by Peters on the Moçambique coast and may therefore have come from Inhambane. I have collected specimens of *Haminea* at Mauritius but although these bear a superficial resemblance to *H. natalensis*, they do not in fact belong to this species, I consider therefore, that Martens' record may not refer to this species but to a closely related one.

The specimens examined agree in most points with the descriptions given by Krauss and Bergh (Pilsbry and Kobelt repeat Krauss' description). Krauss' illustrations show that the lip of the shell projects above the apex—in none of my specimens is this so marked as he suggests.



TEXT-FIG. 3.

Radula teeth of species of *Haminea*. (a) *H. natalensis*, (b) *H. petersi*, (c) *H. alfredensis*, (d) *H. gracilis*.

The figures of the shell (text-fig. 2b) and of the radula teeth (text-fig. 3a) are given for comparison with the other species of which no illustrations of these organs have been published.

*Haminea petersi* Martens. Text-figs. 2a, 3b.

*Haminea petersi* Martens, 1879, p. 717; Pilsbry, 1893, p. 368.

This species has not been recorded since von Martens described specimens collected by Peters at Inhambane.

von Martens' description of the species is as follows: "Shell thin, oblong, sculptured with rather wide, light vertical lines, pale yellowish, a little narrowed above, scarcely umbilicated; upper margin of aperture rising above the spire, narrowly rounded; columella margin deeply receding, a little thickened and simple." To this it should be added that there is a pale golden periostracum, and that between the vertical striae there is a pattern of even more lightly incised horizontal striae. This is the only large *Haminea* from African coasts that has a sculptured shell (text-fig. 2a).

The species is the most abundant form at Inhaca and has been collected at Lake St. Lucia (W. M.)

The colour of the animal when alive is yellowish green, spotted and clouded with dark olive green, brown and yellow. The colour varies with the environment, specimens collected on sandy mud being pale and those among weed dark. In an aquarium they will vary their colour with the background.

Curtain-like egg masses are attached along one side to blades of "sea grass" or to debris in the sand. The eggs are tiny and yellow in colour.

The radula has from 25-30 rows of teeth, each row having 9-12.1.9-12 teeth. The median tooth is broad with a long slender median cusp and a single stubby lateral cusp on each side of it (text-fig. 3b); the laterals are uncinatate with a row of very delicate denticles along the inner edge. The oral cuticle is very thin and, in three of four specimens boiled for radula and jaws, no trace of jaws was found. The fourth had very pale jaws with quadrangular denticles of the usual form. Three gizzard plates are present and these have the form characteristic of the genus.

*Haminea alfredensis* Bartsch. Text-figs. 2c, 3c.

*Haminea alfredensis* Bartsch, 1915, p. 6, pl. 1, fig. 5; Turton, 1932, p. 5.

This species is the commonest form along the south coast of the Union from the Cape Peninsula (U.C.T. records, C.P. 626A - .iii.59 and CPR 47A - .viii.58), Hermanus (W. M.), Knysna (W. M.), Zwartkops near Port Elizabeth (W. M.), Port Alfred (Bartsch, Turton, W. M.) and beyond East London (W. M.).

*H. alfredensis* is almost invariably found amongst *Zostera* and/or *Ruppia* crawling over the leaves and scraping the diatoms off them. Where there is no "sea grass" it may be found creeping just beneath the surface of the sand or mud with little more than shell above the surface and leaving a broad furrow.

In colour the animals are pale yellowish green with clouds of darker green



and spots of yellow, brown and red. When fully extended specimens may reach 30 mm. long by 10–12 mm. broad.

The shell (text-fig. 2c) may be distinguished from that of *H. natalensis* in having a pinched appearance in the anterior half of the shell; in having a rounded posterior margin rather than ovoid; and in having the posterior end of the columella lying almost transversely.

The radula is much larger than that of other South African forms. There are 25–30 rows each with an average of 50.1.50 teeth (text-fig. 3c). The median tooth is tricuspid, the middle cusp slender, the other stumpy; its base is narrowed, not broadened like the others. The laterals are all uncinata with a very fine dentition along the inner margin; the more inner laterals are stout, the outer very slender.

The jaws are strong with rodlets of the usual form, each having a little comb of well-defined teeth at the free end. The gizzard plates are also of the usual form.

*Haminea gracilis* Sowerby. Text-figs. 2d, 3d.

*Haminea gracilis* Sowerby, 1897, p. 20, pl. 6, fig. 16; Turton, 1931, p. 5.

This species was described by Sowerby from Durban; Turton has stated that it was rare at Port Alfred: it was the most abundant form collected at St. Lucia.

This is a more slender species than the others. Its outward appearance and colour are similar. Fully extended specimens are around  $20 \times 8$  mm. The shell (text-fig. 2d) is subcylindrical, slender, pale straw coloured and very finely striated. The aperture is narrow and the apex deeply umbilicate.

The radula is well developed, there are around 25 rows of 12–14.1.12–14 teeth (text-fig. 3d). The median tooth is as usual tricuspid and has a broad base, the laterals are uncinata with a scarcely detectable denticulation. The oral cuticle is chitinized and jaws are present with the usual rodlets. The gizzard plates are as usual.

*Haminea subcylindrica* Sowerby. Text-fig. 2e.

*Haminea subcylindrica* Sowerby, 1897, p. 29.

The species *H. subcylindrica* was described by Sowerby from a specimen found in Durban Bay but it has never been illustrated. Specimen No. 2670 in the Burnup Collection of the Natal Museum, Pietermaritzburg, is listed as ?*H. subcylindrica*. On the base of its container is a note in Burnup's handwriting to the effect that Smith (? E. A. Smith) commented on this specimen "probably right but I only know Sowerby's description; the shell is 3 mm. longer than the type". I agree that the specimen fits Sowerby's description and that it is not

one of the other species described from South Africa. It was collected in Durban Bay. It is illustrated in text-fig. 2e.

Sowerby's description reads "Shell oblong, subcylindrical, very slender, white, almost pointed behind; slightly umbilicate; striated densely all over, the striae stronger, almost convex laterally, aperture fairly broad, wider behind, columella almost straight" and then he adds "a very fragile shell, very finely striated. In form it somewhat resembles *H. brevis* (Q. & G.) but is rather more attenuated at the extremities and consequently less cylindrical." The present specimen shows the characteristic striation quite clearly. Up to the present the animal has escaped capture.

*Philine aperta* (L.).

*Bulla aperta* Linne, 1767, p. 1183; Gmelin, 1791, p. 3424.

*Bullaea schroeteri* Philippi, 1844, p. 94; Krauss, 1848, p. 70.

*Bullaea capensis* Pfeiffer, 1879, p. 93.

*Philine capensis* (Pfr.) Martens, 1879, p. 738 (non *P. capensis* Bergh, 1908).

*Philine aperta* (L.) Pilsbry, 1896, p. 10, pl. 3, figs. 47-56, pl. 9, figs. 1-7, pars; Bergh, 1907, p. 24, pl. 5, figs. 5-10; Smith, 1910, p. 184.

*Philine schroeteri* (Phil.) Bartsch, 1915, p. 9.

*Philine aperta* (L.) O'Donoghue, 1929, p. 7, pl. 1, figs. 1-7; Turton, 1932, p. 8.

The above records refer to papers in which this species is recorded as occurring in Southern Africa.

Until Mme. Pruvot-Fol (1954) separated the European and north Atlantic specimens into *P. quadripartita* Asc. the name *P. aperta* had been used to cover animals from many parts of the world. In affecting this separation Mme. Pruvot was following an opinion discussed by Pilsbry, Smith, O'Donoghue and Turton. None of these considered it was necessary to make the separation although Pilsbry and O'Donoghue must have been familiar with both Cape and northern specimens.

It occurs all round the Cape—older authorities merely say Cape of Good Hope. I have specimens from Saldanha Bay, Hermanus, Zwartkops near Port Elizabeth and from Inhaca.

Farran has described this species from Ceylon, and this may well be synonymous with Cape specimens for Martens (1879) records that Peters had collected this species at Inhambane and the Querimba islands, the latter off northern Moçambique almost on the Tanganyika border.

*Aglaia capensis* (Bergh).

*Doridium capense* Bergh, 1907, p. 29; Smith, 1910, p. 185.

In addition to Bergh's locality, East London, I have collected this species at Zwartkops, near Port Elizabeth and at Knysna. I have little to add to Bergh's description.

The colour when the animal was alive was a rich brown marked and marbled with yellow, orange and white and with parapodia edged with ultramarine and the hindmost end of the head shield tipped with the same blue.

*Aglaia cyanea* (Martens).

*Doridium cyaneum* Martens, 1879, p. 738; Pilsbry, 1896, p. 47; Bergh, 1901, p. 303; Elist, 1903, p. 334.

*Doridium nigrum* Martens, 1879, p. 738; Pilsbry, 1896, p. 47.

*Doridium guttatum* Martens, 1880, p. 306; Pilsbry, 1896, p. 48.

*Doridium marmoratum* Smith, 1844, p. 87, pl. 6, figs. 1-14; Pilsbry, 1896, p. 48, pl. 1, figs. 1-5; Farran, 1905, p. 348.

*Aglaia cyanea* (Martens) Baba, 1936, p. 6, pl. 3, fig. 8; 1937, p. 205, pl. 4, fig. 6.

There is no doubt that all these names refer to one and the same animal, an animal most variable in colour. Pilsbry's figures are copies of those made by Smith.

At certain seasons this species is extraordinarily common at Inhaca and then it shows a range of colour which covers the patterns described as being characteristic of these species. I have no doubt therefore that all these are synonymous. *A. cyanea* and *A. nigra* differ only in colour, the former being blue and the latter black, both are described as having clear yellow and orange spots. The blue and the black, in reality a deep rich purplish black are extreme variations. The edges of the head and body shields and of the parapodia are always a clear indigo blue. Sometimes there is no spotting at all and at others in addition there may be a number of chocolate or brown lines. This latter is the feature of the variety *vittata* which von Martens described from the Ile aux Fouquets, Mauritius. From this locality came the almost identical *A. guttata*. I suspect the difference in texture of skin, which von Martens thought to be diagnostic, to be an artefact of preservation. Again the blue or black on the back may be diluted and then a marbling of blue, brown-orange and grey covers the dorsal surface, the yellow and orange spots and the brown lines persist as do the blue edges to the parts of the body. This latter pattern is diagnostic of *A. marmorata*. Pilsbry's copy of Smith's drawing of this species shows a pattern agreeing with specimens collected at Inhaca. This wide range of colour patterns has been mentioned by Eliot (1903). It is similar to that described for the Mediterranean species *A. depicta*.

At Inhaca all varieties have been found together in one pool and have been seen to pair indiscriminately.

This species is always found in association with species of *Haminea* and *Alys cylindrica* on which it feeds exclusively. The prey is engulfed and, by the action of the strongly muscular buccal mass and pharynx, is swallowed whole. Subsequently the shells are disgorged entire and completely cleaned out, via the mouth, the time elapsing being a few hours only.

In a genus such as this specific differences are difficult. In the past colour and the proportions of the head and body shields and the parapodia have been

most frequently used. The shell gives little assistance, and there are no other hard parts. Both body proportions and colour can only be used on living specimens and even then with caution and discretion. The internal features have been studied in some detail for only a few, mainly European and Mediterranean, species and these show few differences. Dissection of the present species indicates that the structure of the alimentary canal, nervous system and reproductive systems agree with the descriptions given by Guiart for *A. depicta*.

*Chelidonura hirundinina* (Q. and G.).

For synonymy see Pilsbry, 1896, p. 35.

With additional references: Take: 1930, p. 57, fig. 3; Baba, 1937, p. 206; Baba, 1949, pp. 22, 124, fig. 1, pl. 2, fig. 4; Baba and Abe, 1959, p. 279.

This well-known Indo-west-Pacific species has been found on three occasions at Inhaca.

It differs from *Aglaia* in possessing specialized sensory papillae near the mouth. In colour it is usually a dark blue with brighter edges to the head shield and parapodia.

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PART 2. ON APLYSIACEA, APART FROM THE GENUS *Aplysia*,  
FROM SOUTHERN AFRICA.

I. INTRODUCTION.

The members of the genus *Aplysia* from Southern Africa have been discussed in two papers (Macnae, 1955, 1957) and there is nothing further to add to these accounts. The occurrence and distribution of other genera in the order Aplysiacea is treated here. The area studied is from Inhaca island and the Bay of Lourenço Marques in southern Moçambique as far as the vicinity of Cape Town. Most of the species discussed below occur only in the warmer waters of the area.

II. DESCRIPTIONS OF THE SPECIES.

*Akera soluta* (Gm.).

For synonymy and description see Pilsbry, 1893, p. 378, pl. 42, fig. 18 ; Bergh, 1901, p. 308, pl. 23, figs. 36-38, pl. 24, figs. 6-21.

This species has been recorded from many localities in Australia and around the shores of the Indian Ocean. Von Martens (1879) records its presence in northern Moçambique where Peters collected it among the Querimba islands. One specimen in every way agreeing with the description given by Pilsbry and by Bergh was found at Inhaca in December 1954.

*Dolabrifera dolabrifera* (Rang).

For synonymy and description see Engel, 1936, p. 29.

This species has been recorded by Engel (1927) from Durban Bluff and by Watson (1883) from Simons Bay. A single specimen was found at Inhaca in July 1959.

*Dolabella scapula* (Martyn).

For synonymy and description see Engel, 1942.

This species has been recorded from Durban Bay by Krauss (1848) and from Inhaca by O'Donoghue (1929) and by Macnae and Kalk (1958).

This ungainly and unbeautiful animal is the most abundant sedentary

Aplysiid to be found on all the flats around Inhaca. It is active by night and during the day shelters either beneath coral debris or by half burying itself in the sandy or muddy substratum, where it gives off a cloud of purple if trodden on. I have also a specimen collected in the lagoon of the estuary of a small stream on the Transkei coast just south of the Umtata River mouth.

*Dolabella gigas* (Rang).

For synonymy and description see Engel, 1942, and Eales, 1946.

This species has not previously been recorded for the southern shores of the African continent. Two specimens were collected in December 1954 at Inhaca. Shells have been found there on several occasions and it is probable that owing to its close resemblance to the other species it has escaped notice.

In the field it is extremely difficult to distinguish between the two species of *Dolabella*. The colour pattern and texture of the skin are identical; *D. scapula* is said to reach a larger size but there is a very large overlap. The shells of the two are distinctive but it is not possible to palpate the shell differences in the living animal since the integument is too tough. In Mauritius in December 1958, I found both species to be abundant at Flic en Flac. It was noticed then that the two species are distinguishable by the form of the rhinophores. In *D. scapula* these were smooth and of similar texture to the skin of the body, and after retraction they emerged slowly. In *D. gigas* they were slightly stouter in proportion to the body and bore a series of wrinkled rings, thereby contrasting with the general body texture, and after retraction emerged more quickly. The rhinophores of *D. gigas* were usually of a dark chocolate, contrasting on many occasions with the general body colour: in *D. scapula* they were of the same colour as the body, the body pattern extending on to them. Specimens preserved in the ordinary ways are indistinguishable without dissection.

*Notarchus* Cuvier

The members of the family Aplysiidae in which as a general rule the shell is lacking and the body frequently clothed with simple or branching retractable processes, were included by Thiele (1931) in the genus *Notarchus*. Eales and Engel (1935) recognized four genera: *Notarchus*, *Stylocheilus*, *Barnardaclesia* and *Bursatella*, and included them in the subfamily Notarchinae. Earlier authors had used these names and various synonyms in such a way as to cause great confusion. Whether the action of Eales and Engel in recognizing four genera within the group is justified or not is a point which is debatable. If the features mentioned by these two authors in the diagnosis of each of the four genera are tabulated in adjoining columns it is found that the differences are rather on the specific level, certainly not on the generic level. However it is convenient to recognize three subgenera, namely *Notarchus*, *Stylocheilus* and *Bursatella*, for the resemblances between *Barnardaclesia* and *Bursatella* are so numerous that I doubt if there is any justification for keeping these two separate. The latter has priority.

*Notarchus (Stylocheilus) longicaudus* (Q. and G.).

For synonymy see Engel, 1936, p. 57. Additional references: Baba, 1937, p. 221; Eales, 1943, p. 12, fig. 13; Baba, 1954, p. 218, figs. 1, 2.

In January 1960 this species was very abundant at Inhaca. Aggregations of fifty or more were common, these were copulating indiscriminately in heaps among sea grasses in the mid-littoral and scattered around laying, in the usual Aplysiid fashion, gelatinous strings of yellowish eggs. They were also seen swimming in the water. The parapodia were outstretched and the little mollusc glided butterfly-fashion through the water with the current. Change of direction was effected by varying the slope of the parapodia and by twisting the body.

All the specimens were similar in colour. The general body colour was a pale greenish grey with narrow longitudinal purple lines and scattered ocelli, each having a red "pupil" and a bright blue "iris". The body was covered with retractable villi, greyish in colour.

On several occasions juveniles some 5 mm. long have been seen. All of these have been conspicuously striped by a system of purple longitudinal lines on a pale background and without any ocelli.

*Notarchus (Bursatella) leachi* Blainville var. *africana* Engel.

For synonymy and description see Eales and Engel, 1935, p. 282.

This variety of an almost tropicopolitan species is common, sometimes abundant at all seasons in most estuaries where *Zostera* is abundant between Hermanus (80 miles SE. of Cape Town) and East London.

When alive it is a beautiful if ungraceful animal. The neck is capable of great extension, but on handling contracts strongly. Thus an individual of about 15–20 cm. in length is capable of contraction into a ball about 5–8 cm. in diameter. During life the rear of the body occupied by the visceral mass and genital organs bulges and sways on the narrower foot. The tail is always present, variable in length but usually short. The foot is broad when alive but contracts strongly to appear narrow under most methods of preservation.

The whole surface, apart from the sole of the foot and the interior of the mantle cavity, is clothed with branching villi, capable of retraction, but very rarely retracted. The rhinophores and the labial tentacles are also lacinated with compound processes and so are hidden among the "woolly" mass. The villi bordering the foot are simple.

The general colour of the body is a pale greenish dove grey with scattered circular spots (about 1 mm. in diameter during life) of black and opaque white. There is a scattering of dark olive-green and black chromatophores capable of expansion, so causing the animal to appear darker or lighter and frequently expanded in places to form "clouds" and contracted in others. The villi are

normally greyish and usually tinged and edged with pink. The general impression is of a greyish green animal tinged with pink.

The dorsal slit formed by the overlapping parapodia is normally widely open in front and behind and closed in the middle—thus inhalant and exhalant apertures are formed. The anus opens into the rear of the posterior, exhalant aperture. The mantle cavity is almost entirely dorsal in position with only slight extensions down the sides and behind the visceral hump. In life the gill does not hang out. When the animal is allowed to die in water depleted of oxygen, the parapodia separate and then the gill hangs out. I suspect that the type specimen in which the gill hangs out so conspicuously had been killed by suffocation in an attempt to keep the body relaxed.

The anatomy is typically Aplysiid with no peculiarities in the digestive, circulatory or reproductive systems. The nervous system, like the other Notarchinae, shows a concentration of ganglia. The pleurovisceral connectives have shortened and the visceral ganglia lie just behind the pleural and pedal ganglia on the right side: the connective from the left pleural ganglion passes with the pleural and pedal connectives beneath the oesophagus, and the visceral nerves pass along the right side of the animal.

*Notarchus (Bursatella) cirrhifera* (Q. and G.).

*Barnardaclesia cirrhifera* Q. and G., see Eales and Engel, 1935, p. 282; Eales, 1952, p. 71.

This species is common in estuaries in Natal where it appears to replace *N. (B.) leachi*. I have specimens from St. Lucia, Richards Bay, Durban, and from Uvongo near Port Shepstone.

Most of our knowledge of this species is contained in Eales' description, the earlier accounts being mainly repeats of the original description by Quoy et Gaimard (1832). Bergh (1902) gave a few additional features. My only comment on Eales' account is that the visceral mass and genital organs do not normally lie so far forward as she has suggested, even though they may lie well forward in contracted specimens. These organs occupy their usual place immediately beneath the pallial cavity. As in *N. (B.) leachi* this cavity is almost entirely dorsal with only small extensions down the sides and rear. The foot is normally broad but narrow in contraction. The animal creeps over muddy ground and so makes good use of its broad foot. The tail is variable, usually long.

The colour of the animal varies from a pale greyish green to a dark olive-brown; due to the variable extension of dark green, olive-brown and black chromatophores on a translucent grey-green background. The villi are normally not so abundant as in the former species and are entirely greyish without the pink tinge so characteristic of *N. (B.) leachi*. Highly diagnostic of the present species are the ocelli, which are irregularly shaped, and occur on the dorsal surface and may be many or few. Each is ovoid, with an orange



"pupil" circled by an "iris" of turquoise blue edged both outwardly and inwardly with black and with an orange surround which trails irregularly into the general body colour. Each ocellus is about 1-1.5 mm. in diameter during life.

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